CLAIMS

1. Method for increasing the density of a perovskite, which comprises the steps of:

(a) placing a perovskite feedstock in a high-pressure cell of a high pressure/high temperature (HP/HT) apparatus;

(b) subjecting said feedstock to pressures in excess of about 2 Kbar and temperatures above about 800° C for time in excess of 3 minutes to produce an cubic perovskite product having a density which is greater than said preform; and

recovering said perovskite product.

2. The method of claim 1, wherein said perovskite can be represented by the structure, ABO_3, where:

A is one or more of Na^{+}, K^{+}, Rb^{+}, Ag^{+}, Ca^{+2}, Sr^{+2}, Ba^{+2}, Pb^{+2}, La^{+3}, Pr^{+3}, Nb^{+3}, Bi^{+3}, Y^{+3}, Ce^{+4}, or Th^{+4}; and

B is one or more of Li^{+}, Cu^{+2}, Mg^{+2}, Ti^{+3}, V^{+3}, Cr^{+3}, Mn^{+3}, Fe^{+3}, Co^{+3}, Al^{+3}, Ni^{+3}, Rh^{+3}, Hf^{+4}, Ti^{+4}, Zr^{+4}, Mn^{+4}, Ru^{+4}, Pt^{+4}, Nb^{+5}, Ta^{+5}, Mo^{+6}, or W^{+6}.

3. The method of claim 2, wherein said preform is $SrRuO_3$.

4. The method of claim 1, wherein said perovskite feedstock is one or more of powder or a preform.

5. The method of claim 1, wherein said perovskite product has a density of greater than about 60% of its theoretical density.

6. The method of claim 5, wherein said perovskite product has a density of greater than about 90% of its theoretical density.

7. The method of claim 1, wherein step (b) is conducted for a time ranging from between about 3 minutes and 24 hours.

8. The method of claim 1, wherein said pressure ranges from about 2 to 75 Kbar and said temperature ranges from about 800° to 1600° C.

9. The method of claim 7, wherein said pressure ranges from about 2 to 75 Kbar and said temperature ranges from about 800° to 1600° C.

10. The densified perovskite product produced according to the process of claim 1.

11. The densified perovskite product produced according to the process of claim 2.

12. The densified perovskite product produced according to the process of claim 3.

13. The densified perovskite product produced according to the process of claim 4.

14. The densified perovskite product produced according to the process of claim 5.

15. The densified perovskite product produced according to the process of claim 6.

16. The densified perovskite product produced according to the process of claim 7.

17. The densified perovskite product produced according to the process of claim 8.

18. The densified perovskite product produced according to the process of claim 9.

19. Method for increasing the density of a perovskite, which comprises the steps of:

(a) placing a perovskite feedstock in a high-pressure cell of a high pressure/high temperature (HP/HT) apparatus;

(b) subjecting said feedstock to pressures in excess of about 2 Kbar and temperatures above about 800° C for time adequate to increase the density of said feedstock to above about 60% of its theoretical density; and

(b) recovering said perovskite product having a density above about 60% of its theoretical density.

20. The method of claim 19, wherein said perovskite is represented by the structure, ABO_3, where:
A is one or more elements of Na^{+}, K^{+}, Rb^{+}, Ag^{+}, Ca^{+2}, Sr^{+2}, Ba^{+2}, Pb^{+2}, La^{+3}, Pr^{+3}, Nb^{+3}, Bi^{+3}, Y^{+3}, Ce^{+4}, or Th^{+4}; and
B is one or more elements of Li^{+}, Cu^{+2}, Mg^{+2}, Ti^{+3}, V^{+3}, Cr^{+3}, Mn^{+3}, Fe^{+3}, Co^{+3}, Al^{+3}, Ni^{+3}, Ni^{+3}, Rh^{+3}, Hf^{+4}, Ti^{+4}, Zr^{+4}, Mn^{+4}, Ru^{+4}, Pt^{+4}, Nb^{+5}, Ta^{+5}, Mo^{+6}, or W^{+6}.

21. The method of claim 19, wherein said preform is $SrRuO_3$.

22. The method of claim 19, wherein said perovskite feedstock is one or more of powder or a preform.

23. The method of claim 19, wherein said perovskite product has a density of greater than about 90% of its theoretical density.

24. The method of claim 19, wherein step (b) is conducted for a time ranging from between about 3 minutes and 24 hours.

25. The method of claim 19, wherein said pressure ranges from about 2 to 75 Kbar and said temperature ranges from about 800° to 1600° C.

26. The method of claim 25, wherein said pressure ranges from about 2 to 75 Kbar and said temperature ranges from about 800° to 1600° C.